

REMARKS

In response to the final Official Action of May 18, 2005, claims 1 and 16 have been slightly amended to more particularly point out and claim the present invention in a manner which makes clear the non-obviousness of these claims in view of the prior art for the reasons set forth below.

Referring now to paragraph 2 of the Official Action, it is noted that the Abstract is now acceptable and overcomes the previous objections raised by the Examiner.

Referring now to paragraphs 3 and 4 of the Official Action, it is respectfully submitted that claims 1, 2, 4, 7, 9, 11, 15, 16, 25, 26 and 29 are not obvious in view of US patent 6,614,478, Mead, further in view of US patent 4,591,901, Andrevski.

With regard to claim 1, the Examiner states that Mead discloses in Figures 3 and 4 a joining construction for mounting CCD cells of a color line camera in an aligned fashion on a color splitting prism wherein each of the CCD cells has a light receiving input window and an opposite rear surface. The Examiner notes that Mead does not disclose a prism which is attached to a prism housing. The Examiner further relies upon Andrevski, taking the position that mounting plates 206 and 208 as shown in Figure 2 thereof could be combined with the prism of Mead so as to increase the structural integrity of the prism. The Examiner then goes on to assert that the combined construction of Andrevski in Mead would give rise to the elements of claim 1 for the reasons set forth at page 3, second paragraph. Applicant respectfully disagrees.

In particular, Mead describes color separation prisms having solid state imagers mounted thereon. At column 6, lines 4-6, it is stated:

“...each imaging chip 34 [sic, actually 32]¹ is attached to its corresponding prism face with index-matched adhesive 50.”

¹ It should be noted that there are reference numeral errors in the Mead patent, but that from a review of the entire disclosure, it is clear that the imaging chip is denoted by reference numeral 32 and the circuit board by reference numeral 34.

It is further stated column 5, lines 32-37:

“Silicon imaging chip 32 is attached by the side opposite active circuitry (bottom face opposite face to that of the active circuitry) to an area of the circuit board 34 using a layer of conductive adhesive 42. This adhesive is preferably one of the standard two-part silver-filled epoxy products available from a number of suppliers.”

From these recited passages in Mead and further in view of Figure 3 thereof, it is clear that the sensor/imaging chip 32 is attached by its rear surface to a circuit board 34 which circuit board corresponds to the fastening element of claim 1 of the present invention in the sense that it is larger than the sensor/imaging chip. It is therefore perfectly clear from the above-recitals and Figure 3 of Mead that the imaging chip in Mead is directly attached to the prism by an adhesive layer 50 between the sensing area 40 of the imaging chip and a face of prism 10. This arrangement in Mead is also made clear in the abstract thereof wherein it states:

“...filling the space between each output face of the prism and the top face of the corresponding image sensor with index-matched adhesive; and causing the index-matched adhesive to become rigid while maintaining the alignment of the three image sensors.”

Such an arrangement as that disclosed in Mead is precisely the arrangement which is avoided by the structure of the present invention as disclosed and claimed herein. In this regard, reference is made to page 4, lines 23-29 of the present invention wherein it states:

“By means of the invention, where – opposite to said publications described above – the CCD cells are attached, instead of the color prism itself, to the housing of said prism by means of a fastening element that is essentially larger than the cell, the effects of the harmful properties of glues, i.e. hardening shrinkage and thermal expansion, are sufficiently eliminated. By means of the small fastening area between the fastening element and the housing of the color splitting prism, heat transfer therebetween is reduced.”

Thus, the present invention is not in any way taught or suggested by Mead since Mead is the very type of prior art whose limitations the present invention was designed to overcome. It is

therefore clear that the present invention as claimed makes the attachment of the CCD cells to a prism housing in a very different manner from the disclosure in Mead. In claim 1, it specifically recites third glue joints abutting the fastening element and the margins of the housing, wherein the third glue joints are of a thermally insulating glue or cast plastic.² Furthermore, claim 1 now specifically recites that the third glue joints abut the fastening element and said margins of the housing rather than the previous use of the word “between.” In this regard, it should be noted that the prism housing 2 of the present invention has a construction that supports the prisms around it but is separate from the prisms. In contrast, Mead does not show any glue abutting circuit board 34 to prism 10 (see Figure 3). The Examiner agrees with this conclusion as noted in the Official Action at page 3, lines 14-16. In addition, Mead does not show any prism housing at all and therefore cannot show any glue between the circuit board and such a housing because it simply does not exist. The prism housing as disclosed and claimed in the present invention is in fact a key feature of the present invention.

Furthermore, as noted above, Mead defines the adhesive with which the sensor is attached to the prism as being an index-matched adhesive 50. Such an adhesive means that it has the same refractive index as that of the prism (see column 3, line 55 through column 4, line 4 of Mead). In the structure of the present invention, the refractive index of the adhesive is irrelevant because there is no adhesive in the path of light at all. The present invention does not have any adhesive which is between the prism and the imaging chip through which light passes.

With regard to the adhesive with which the sensor is attached to the circuit board, Mead states that it is conductive, where the word “conductive” is used in the electrical sense since Mead discloses a silver-filled epoxy. It is known to those skilled in the art that electrical conductance is

² Support for this amendment to claim 1 (and claim 16) is seen in Figure 3, third glue joints 11, as described at page 7, line 28 through page 8, line 4. The amendment of claim 1 to recite “abutting” rather than “between” with respect to the third glue joints is not believed to raise new issues since it is clearly shown in the specification as originally filed and since this change in word usage makes clear how the third joints are positioned relative to the housing and the fastening element.

not the same as thermal conductance and therefore a material which may have a high electrical conductance does not necessarily mean that it has a high thermal conductance, and *vice versa*. For instance, it is well known that glass has a high thermal conductance but an extremely low electrical conductance. Accordingly, Mead defines properties of adhesives which are meaningless in the context of the present invention as claimed and in particular with regard to the thermally insulating glue as disclosed and claimed for the third glue joints of claim 1.

In summary, Mead defines a structure for attaching imaging chips directly to prism faces with adhesive having a refractive index that matches that of the prism and wherein the adhesive is between the prism and the front light receiving surface of the imaging sensor. As noted above, this is completely opposite to the design of the present invention. Therefore, it is respectfully submitted that one of ordinary skill in the color separation prism imaging art would not be motivated to combine Mead and Andrevski, and even if these references are combined, they would not give rise to the joining construction for mounting CCD cells of a color line printer in an aligned fashion on a color splitting prism as set forth in amended claim 1.

For all of the foregoing reasons, it is therefore respectfully submitted that claim 1 as amended is distinguished over Mead further in view of Andrevski.

Since claim 1 is believed to be distinguished over the cited art, it is also respectfully submitted that dependent claims 2, 4, 7, 9, 11, and 15, all of which ultimately depend from amended claim 1, are further distinguished over Mead in view of Andrevski.

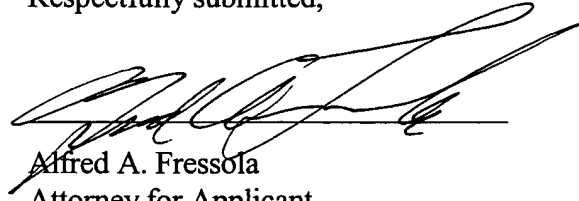
Independent claim 16 has been amended in a manner similar to that of claim 1 and for the same reasons as presented above, it is respectfully submitted that claim 16 is not suggested by Mead further in view of Andrevski. Since claim 16 is believed to be distinguished over Mead and Andrevski, it is also respectfully submitted that claims 25, 26 and 29, all of which ultimately depend from amended claim 16, are further distinguished over Andrevski.

It is noted that claim 17, 21, 30 and 31 are allowed by the Examiner and it is further noted that claims 3, 5, 6, 8, 10, 12-14, 18-20, 23, 24, 27 and 28 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Since this latter group of claims all

ultimately depend from amended claim 1 or 16, claims 3, 5, 6, 8, 10, 12-14, 18-20, 23, 24, 27 and 28 are believed to be allowable in their current dependent form.

For all of the foregoing reasons, it is respectfully submitted that the present application as amended is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,



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Dated: July 18, 2005

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